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ABSTRACT

One of the potential negative effects of online courses is a loss of social relationships and a loss of the sense of community that is usually present on a traditional campus. This paper presents evidence that collaborative learning strategies, which require relatively small classes or groups actively mentored by an instructor, are necessary in order for World Wide Web-based courses to be as effective as traditional classroom courses. The nature of collaborative learning versus other models, as well as some of the issues raised by Web-mediated education are reviewed. Results of recent studies at the New Jersey Institute of Technology and Penn State, indicating that collaborative learning is important to the success of asynchronous learning networks (ALNs) in creating positive outcomes for students, are summarized. The paper concludes that the question of how to build and sustain online learning communities is a prime area where researchers on ALNs ought to be focusing their efforts. (Contains 13 references.) (Author/AEF)

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COLLABORATIVE LEARNING IN ASYNCHRONOUS LEARNING NETWORKS: BUILDING LEARNING COMMUNITIES

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ABSTRACT: One of the potential negative effects of online courses is a loss of social relationships and of the sense of community that is usually present on a traditional campus. Evidence is presented that collaborative learning strategies, which require relatively small classes or groups actively mentored by an instructor, are necessary in order for Web-based courses to be as effective as traditional classroom courses.

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1. INTRODUCTION

The use of the Internet to deliver "anytime, anywhere" education is frequently referred to by the name "asynchronous learning networks" (ALN). There are two possible models for the use of ALNs. One model is the "mass market:" emulate the previous, primarily "one way" distance learning delivery modes of sending material to students, receiving back individual assignments or test materials, and providing some means of limited one-to-one communication between the student and the instructor. Web pages might replace video for lectures, and email might replace surface mail for student-teacher correspondence, but it is basically the same pedagogical model. This does have the advantage to educational institutions that education can be very "cheap;" hundreds or even thousands of students can be accommodated in a single course. Inexpensive adjuncts can be hired to do the grading and communication.

A very different model is to use the technology to try to create the kind of learning community that can arise in a good graduate seminar. Typically this is where the students learn with and from one another, collaboratively, and the faculty member structures the topics, provides expertise, and works closely with students preparing their projects for presentation to the group. In this model, the faculty member is directly and actively involved in facilitating collaboration and group interaction among the learners, on a daily basis. There are limits to the number of students who can be successfully accommodated in such a "learning network" [Harasim, et. al. 1994] format. Though the numbers are approximately double the 10 to 15 that face to face seminars can easily include without making it difficult for everybody to participate actively in all the sessions, they nevertheless make the "learning network" or "learning community" a relatively expensive educational delivery choice. The question is: is it worth it? Is online collaborative learning really superior to using the web for students to individually interact with educational materials? How do both compare to traditional classrooms of various types (the small seminar style classroom, and the mass lecture hall)?

Our evidence on these matters is limited, but this paper will briefly describe some studies that have been conducted which provide some data to answer these questions.

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First, however, it will review the nature of collaborative learning vs. other models, and some of the issues raised by Web-mediated education.

2. THE END OF COMMUNITY?

The issues raised here are not just of "academic" concern; they have been increasingly raised in the mass media, and have become issues of general public concern. Consider, for instance, the rather sensational headlines used to describe the release of some preliminary findings from a study of Internet users in Pittsburgh. "Researchers find sad, lonely world in Cyberspace (The New York Times, see figure 1) and "Study: Internet Causes Depression" (The Washington Post- see http://search.washingtonpost.com/wp-srv/WAPO/19980831/ V000514-083198-idx.html) certainly would make a prospective faculty member or student pause before signing up for an online course.

The issues raised in the Carnegie Mellon study of Pittsburgh Internet users are serious ones, but the sensationalism is troubling. As my colleague, John Sener of Virginia noted in an online commentary, "I think the creator of this headline should be sent to the blackboard and made to write 100 times: 'Correlation does not necessarily imply causation.' "... More importantly, statistical significance has been confused with substantive significance. Since when does a decrease from 66 people to 63 people in one's active "social circle" constitute a "sad lonely world?"

Computer-mediated communication can be the basis for people with shared interests to form and sustain relationships and communities [Hiltz and Wellman 1997]. Compared to communities "offline," computer-supported communities tend to be larger, more dispersed in space and time, more densely knit, and have members with more heterogeneous social characteristics but with more homogeneous attitudes. Despite earlier fears to the contrary, online communities can provide emotional support and sociability as well as information and instrumental aid. However, for this to occur takes both the right software to support group communication (a topic beyond the scope of this paper), but also an emphasis upon collaborative learning approaches rather than individual learning.

Exhibit 1: Excerpts from a Recent News Story
August 30, 1998 Copyright 1998 The New York Times Company

Researchers Find Sad, Lonely World in Cyberspace By Amy Harmon

In the first concentrated study of the social and psychological effects of Internet use at home, researchers (including Robert Kraut) at Carnegie Mellon University have found that people who spend even a few hours a week online experience higher levels of depression and loneliness than they would have if they used the computer network less frequently... the new study... raises troubling questions about the nature of "virtual" communication and the disembodied relationships that are often formed in the vacuum of Cyberspace... Participants in the study reported a decline in interaction with family members and a reduction in their circles of friends that directly corresponded to the amount of time they spent online...

In measuring depression, the responses were plotted on a scale of 0 to 3, with 0 being the least depressed and 3 being the most depressed. Loneliness was plotted on a scale of 1 to 5... By the end of the study, the researchers found that one hour a week on the Internet led, on average, to an increase of .03, or 1 percent, on the depression scale, a loss

of 2.7 members of the subject's social circle, which averaged 66 people, and an increase of .02, or four-tenths of 1 percent, on the loneliness scale.

The subjects exhibited wide variations in all three measured effects, and while the net effects were not large, they were statistically significant in demonstrating deterioration of social and psychological life, Kraut said. ..."Our hypothesis is there are more cases where you're building shallow relationships, leading to an overall decline in feeling of connection to other people," Kraut said.

The study tracked the behavior of 169 participants in the Pittsburgh area who were selected from four schools and community groups.... Because the study participants were not randomly selected, it is unclear how the findings apply to the general population. It is also conceivable that some unmeasured factor caused simultaneous increases in use of the Internet and decline in normal levels of social involvement. Moreover, the effect of Internet use varied depending on an individual's life patterns and type of use...
[HomeNet is at: http://homenet.andrew.cmu.edu/progress/]

End of exhibit

3. WHAT IS COLLABORATIVE LEARNING?

Passive approaches to learning assume that students "learn" by receiving and assimilating knowledge individually, independent from others [Bouton and Garth 1983]. In contrast, active approaches present learning as a social process that takes place through communication with others [Mead 1934]. The learner actively constructs knowledge by formulating ideas into words, and these ideas are built upon through reactions and responses of others [Bouton and Garth 1983; Alavi 1994]. In other words, learning is not only active but also interactive.

In particular, collaborative or group learning refers to instructional methods that encourage students to work together on academic tasks. Collaborative learning is fundamentally different from the traditional "direct-transfer" or "one-way knowledge transmission" model in which the instructor is the only source of knowledge or skills [Harasim 1990].

In collaborative learning, instruction is learner-centered rather than teacher-centered and knowledge is viewed as a social construct, facilitated by peer interaction, evaluation and cooperation. Therefore, the role of the teacher changes from transferring knowledge to students (the "sage on the stage") to being a facilitator in the students' construction of their own knowledge (the "guide on the side"). Some examples of collaborative learning activities are seminar-style presentations and discussions, debates, group projects, simulation and role-playing exercises, and collaborative composition of essays, exam questions, stories or research plans [Hiltz and Turoff 1993]. This new conception of learning shifts away the focus from the teacher-student interaction to the role of peer relationships in educational success [Johnson 1981].

3. THE IMPORTANCE OF COLLABORATIVE LEARNING IN AN ALN ENVIRONMENT

There is no question that ALN's have disadvantages as well as advantages in comparison with traditional classrooms. The major advantage is convenience ("anytime/anywhere"), which in turn facilitates students being able to have more total interaction each week with the teacher and with peers, and being able to learn at the pace

and the times best suited to their individual needs. The major shortcomings are (1) limited bandwidth or "media richness" [Daft & Lengel 1986] and (2) the frustration of waiting an unpredictable amount of time to receive any reaction or feedback. The weaknesses of ALN as a mode of communication is the decrease of the feeling of "social presence" of the teacher and the other group members. In turn, this can severely decrease feelings of motivation and involvement, and thus negatively affect the learning outcomes. However, an emphasis on collaborative learning can emphasize the advantages and overcome some of the disadvantages of asynchronous computer-mediated communication.

Several studies have shown that collaborative learning strategies result in more student involvement with the course [Hiltz 1994], and more engagement in the learning process [Harasim 1990]. Collaborative learning methods are more effective than traditional methods in promoting student learning and achievement [Johnson 1981], and enhance student satisfaction with the learning and classroom experience. The next few pages briefly summarize some recent studies that provide evidence that collaborative learning is very important to the success of ALNs in creating positive outcomes for students.

3.1. Field Trials on the "Virtual Classroo m®" at NJIT

In an ongoing project at NJIT spanning more than a decade, data have been collected not only on all students in sections using its ALN system, the Virtual Classroom® (VC), plus web pages and videotapes or CD ROM's for lecture type material, but also in sections of the same course taught by the same instructor or set of instructors, using roughly the same syllabus, in three other modes: traditional face-to-face, "traditional" distance mode of all video, and a combination of face-to-face and VC. The results for the post course questionnaire for a recent three year phase of the project (over 600 responses from students who used the system) and grade data for all three years will be summarized here. In the post-course questionnaire, students were requested to compare their experiences in their course which used VC, to that in other college courses delivered face-to-face. Generally, the results of these subjective evaluations were positive. For example:

- Over half of the students in the VC + video experimental sections felt that having this option available enabled them to complete more courses that semester than would have otherwise been possible (and thus make faster progress toward their degree).
- Subjectively, the majority of students feel that the V C improved the convenience of course access (73%), access to their professors (65%) , and the quality of learning (58%).
- Correlation statistics support the theoretical premise that active participation online by both faculty and students, and the use of group or collaborative learning strategies in ALN, are positively related to desirable outcomes.

A multi-item scale was constructed to measure perceived degree of collaborative learning, which correlated significantly ($p=<.001$) with scales measuring overall course outcomes ($R= .31$, $N= 749$) , and overall rating of the virtual classroom experience ($R=.30$; $N= 632$).

Outcomes as measured by grades in the courses show no significant differences between modes. Only two courses showed significant differences, one in each direction. Course grades are only weakly correlated with most variables measured, except for overall grade point average ($R^2= .21$, $N= 1531$, $p = <.001$).

Though the degree of perceived collaborative learning in the course correlates significantly with perceived outcomes, as noted above, "correlation is not causation." Being online is confounded with collaborative learning. In addition, all of the courses supposedly used collaborative learning approaches (though this was implemented better and more consistently in some courses than in others). We need a more experimental approach to test whether collaborative learning is a key mechanism in making ALN's effective, and the extent to which collaborative learning groups can be as effective as face-to-face collaborative learning groups.

3.2 A Field Experiment on Collaborative Learning at NJIT

Recently completed dissertation research [Benbunan-Fich 1997] is based on a field experiment that compared groups and individuals solving ethical case scenarios, with and without computer-mediated communication support. A 2x2 factorial design crossing two modes of communication (offline with a task time of two hours vs. asynchronous computer conference with a task period of ten days; these times were established as optimal in pilot studies) and two types of teamwork (individuals working alone vs. individuals collaborating in groups) was designed to assess the separate and joint effects of medium of communication and collaborative vs. individual learning strategies. In both conditions, undergraduate students in a Computers and Society course received an ethical case scenario comprising the task one week ahead of time, and were permitted to use whatever written or other materials they wished while discussing the case. In the individual offline condition, students solved the case individually, in an in-class exercise like an open-book quiz, and received individual grades based on their own performance. In the individual online condition, students simply posted their individual responses online. In the group offline condition, team members discussed and solved the case by interacting face-to-face and prepared their report. In the group online condition, team members interacted asynchronously using a computer conference as the only means of communication, and submitted a group report.

Assignment of the 136 subjects to experimental conditions was done as close to randomly as possible some students were truly "distance" students and could not be assigned to come to campus. Students randomly assigned to a group condition were then randomly assigned to a specific group. Perceived learning was measured immediately after the experiment in the post-test questionnaire, using a seven item scale adapted from Hiltz (1994; Chronbach's alpha = .92). Quality of the analysis produced was rated by three expert judges on a number of dimensions, including the extent to which the correct legal principles were identified and applied to the scenario. "Actual" learning was measured in the final exam with two similar ethical scenarios, two weeks after the experiment ended.

The results indicate that working in groups, instead of alone, significantly increases motivation, perception of skill development and solution satisfaction. In terms of self-reported learning [Hiltz & Benbunan-Fich 1997], there is, as hypothesized, an interaction between medium of communication and group vs. individual learning. According to the results, conditions with (or without) both factors, i.e., individuals-manual and groups online, perceived higher learning than conditions in which only one of the factors was present.

The implications for ALN are that putting individuals online to interact with course materials is not as effective as the traditional classroom, but that using collaborative learning approaches can make online learning at least as effective as the traditional classroom.

3.3. A Field Experiment at Penn State

A total of 43 graduate students participated in a recent experiment at Penn State Harrisburg conducted by Ocker and Yaverbaum [1998]. The vast majority (40) were part-time students with full-time employment (38). All students were enrolled in the core information systems class required of all MBA and MS/IS students. The authors point out that although there has been more than a decade of literature on computer-mediated communication in education, the research has been unclear as to whether it is an effective replacement for FtF collaboration.

This study sought to add to this body of research by exploring the effects of two modes of collaboration on student groups. Following a repeated-measures experimental design, each student group collaborated on two case studies, one using face-to-face collaboration and the other using asynchronous computer conferencing technology as a means of collaboration. The findings indicate that asynchronous collaboration is as effective as face-to-face collaboration in terms of learning, quality of solution, solution content, and satisfaction with the solution quality. However, students were significantly less satisfied with the asynchronous learning experience, both in terms of the group interaction process and the quality of group discussions.

4. SUMMARY AND CONCLUSION: CREATING AND SUSTAINING LEARNING COMMUNITIES

Collaborative learning designs are more effective for online learning than pedagogical approaches that emphasize individuals working alone with materials posted online. Software structures can be constructed which will support group collaboration. However, they can only facilitate the desired behavior, not produce it. For the group to adapt a structure of interaction that is collaborative in nature, the instructor must mold, model, and encourage the desired behavior, and the students must be able and willing to participate regularly.

A number of studies indicate that when collaborative learning is used in ALN delivery, "objective" results in terms of mastery of material and efficiency of education tend to be equal to or better than traditional face to face classes. However, even when collaborative learning is used, the current "state of the art" of systems plus pedagogy seems to lead to less feeling of community than is typically obtained in face to face small group interaction. The question of how to build and sustain online learning communities is thus a prime area where researchers on ALN ought to be focusing their efforts.

The most basic premise from which all online teaching should begin is that the goal is to build a learning community and to facilitate the exchange of ideas, information, and feelings among the members of the community. Every "electure" (electronic lecture) should be designed to include questions for discussion or response among groups of students, rather than simply representing one way transmission of "knowledge." The students, as well as the instructor, should be encouraged to raise new topics and ask questions of the class; and to respond to one another's contributions. This kind of daily interaction does demand constant attention from the instructor, and thus is a labor-intensive mode of course delivery.

Colleges and universities ought to be concerned not with how fast they can 'put their courses up on the Web," but with finding out how this technology can be used to build and sustain learning communities. This does have fiscal implications: using collaborative

learning approaches requires relatively small classes or sections of courses, which need daily attention from a faculty member.

REFERENCES

[Alavi 1994]. Alavi, M. (1994). "Computer-Mediated Collaborative Learning: An Empirical Evaluation". MIS Quarterly. June, pp. 150-174.

[Benbunan-Fich 1997]. Benbunan-Fich, R. (1997). Effects of Computer-Mediated Communication Systems on Learning, Performance and Satisfaction: A Comparison of Groups and Individuals Solving Ethical Case Scenarios. Ph.D. dissertation, Rutgers University/NJIT joint program in the Management of Computer Systems.

[Bouton & Garth 1983]. Bouton, C. and Garth, R. Y. (1983). Learning in Groups. San Francisco: Jossey-Bass, Inc.

[Daft & Lengel 1986]. Daft, R. L and Lengel R. H. (1986). Organizational information requirements, media richness and structural design. Management Science, Vol. 32, N.5, 554-571.

[Harasim 1990]. Harasim, L. Ed. (1990). On-Line Education: Perspectives on a new medium, New York: Praeger/Greenwood.

[Harasim et. al. 1995]. Harasim, L., Hiltz, S. R., Teles, L., and Turoff, M., (1995). Learning Networks: A Field Guide to Teaching and Learning Online. Cambridge MA: MIT Press.

[Hiltz 1994]. Hiltz, S. R. (1994). The Virtual Classroom: Learning without limits via computer networks. New Jersey: Ablex Publishing Corporation.

[Hiltz & Benbunan 1997]. Hiltz, S. R. and Benbunan-Fich, R. (1997). Evaluating the Importance of Collaborative Learning in ALN's. Paper submitted for Frontiers in Education session on Evaluating Asynchronous Learning Networks, November.

[Hiltz & Turoff 1978/1993]. Hiltz, S. R. and Turoff, M. (1978/1993). The Network Nation: Human Communication via Computer. Revised edition, Cambridge MA: MIT Press. .

[Hiltz & Wellman 1997]. Hiltz, S. R. and Wellman, B. (1997). Asynchronous learning networks as a virtual classroom. Communications of the ACM, Vol. 40, N. 9, September, pp. 44-49.

[Johnson 1981]. Johnson, D. W. (1981). Student-student interaction: The neglected variable in education. Educational Research, Vol. 10, N.1, pp. 5-10.

[Mead 1934]. Mead, G. H., (1934). Mind, Self and Society. Chicago, U. of Chicago Press.

[Ocker & Yaverbaum 1998]. Ocker, R. J. and Yaverbaum, Gayle J. (1998). Asynchronous Computer-mediated Communication versus Face-to-face Collaboration: Results on Student Learning, Quality and Satisfaction. Working paper, School of Business Administration, Pennsylvania State University at Harrisburg.

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